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KANSAS PETROLEUM.

By EDWARD BARTOW and ELMER V. MCCOLLUM, University of Kansas, Lawrence.

Read before the Academy, at Manhattan, November 27, 1903.

SINCE our first report on Kansas Petroleum (*Trans. Kan. Acad. Sci.*, vol. XVIII, p. 57), we have collected and examined twenty-five specimens of crude petroleum from Kansas and other fields, making thirty-three in all.

The oils from the Kansas field were obtained from the following localities; unless otherwise noted, they were obtained by one of us:

Sample No. 9 was from well No. 5 of the Illinois Valley Oil and Gas Company's property, about one and one-half miles northwest of Cherryvale, Montgomery county. The sample was pumped directly from the well.

Samples Nos. 10 and 11 were sent to me by the Independence Gas Company. No. 10 was described as coming from the Brownfield well, in the center of the southwest quarter of section 3-32-15, and No. 11 from the Giger well, in the southwest quarter of section 29-33-15.

Sample No. 19 was from well No. 3 of the Illinois Valley Oil and Gas Company, about one and one-half miles northwest of Cherryvale, and was collected directly from the well.

Sample No. 20 was from a well about one mile south of Neodesha, and was collected directly from the well.

Sample No. 21 was from a well about a mile west of Neodesha, Wilson county, and was collected from a tank at the well.

Sample No. 23 was from the Bolt well of the Independence Gas Company, near Bolton, Montgomery county, section 18-33-15. It was taken from a tank at the well.

Sample No. 24 was from the Fellows well of the Independence Gas Company, north of Bolton, Montgomery county, section 8-33-15. It was taken from a tank at the well.

Sample No. 25 was taken from the Brewster well of the Drum Creek Oil and Gas Company, four miles east of Independence, Montgomery county, section 3-33-16. This sample was collected as it was forced out between the casings by the gas pressure.

Sample No. 26 was from the Brownfield well of the Independence Gas Company, about four miles northwest of Independence, Montgomery county, section 3-32-15. It was collected directly from the flowing well.

Sample No. 27 was from the Mosher well of the Independence Gas Company, northwest of Independence, Montgomery county, section 35-31-15, and was collected from a tank.

Sample No. 28 was from the Brewster well of the Drum Creek Oil and Gas Company. This is the same well as No. 25, but this oil was pumped directly from the well.

Sample No. 29 was from the W. S. Gilliland well No. 1 of the Caney Gas, Oil and Mining Company, at Caney, Montgomery county, section 5-35-14. It was taken directly from the well.

Sample No. 30 was from the M. De Armond No. 2 of the Interstate Oil and Gas Company, at Peru, Chautauqua county, section 15-34-12. It was taken from the flowing well.

Sample No. 31 was from the T. L. De Armond well No. 1 of the Interstate Oil and Gas Company, at Peru, Chautauqua county, section 15-34-12. It was blown from the well by natural gas.

Oil No. 30 was said to come from the oil sand at a depth of from 920 to 960 feet, while that in No. 31 was said to come from a sand at 596 to 611 feet. These wells were only a few hundred feet apart.

Sample No. 32 was said to be from a well on the G. R. Wheeler farm, near Tyro, Montgomery county, section 30-34-15. This sample was furnished the writer by Mr. B. B. Canterbury, of Coffeyville.

Oils from outside the state of Kansas have been obtained as follows:

Sample No. 12 was from the Newcastle, Wyo., field, and was sent to us by Prof. E. E. Slossen, of the University of Wyoming.

Sample No. 18 was sent to us from Lima, Ohio, by Mr. C. J. Brotherton, of that city.

Sample No. 18 was from the Bartlesville, I. T., field, and was obtained by one of us from a tank-car.

Samples 33, 34 and 35 were obtained for us by Mr. Wesley Merritt, the industrial commissioner of the Santa Fe system.

Sample No. 33 was from Beaumont, Tex.

Sample No. 34 was from the Olinda district, California.

Sample No. 35 was from the Kern River district, California.

The table on next page shows a comparison of the specific gravity, flash and burning points of these samples.

From those analyses we would call attention to the following facts: The specific gravity varies greatly, from .845 to .949, a difference of about .100. In general, the oils of the higher specific gravity are found in the northeastern part of the field, although in the neighborhood of Humboldt, in the northeastern section, we find oils of a specific gravity of .860 and .940, a difference of .074. One sample sent to us from near Bolton has a specific gravity of .741. This is .200 below the heaviest oil that we collected personally. Exclusive of the very light sample, which seems phenomenal for Kansas, there is a greater variation than we have found recorded for any other field.

The flash points and burning points vary from below 10° C. in the

Number.	Specific gravity.	Baume.	Flash point.		Burning point.	
			Fahrenheit.	Centigrade.	Fahrenheit.	Centigrade.
			Ordinary temperature.		Ordinary temperature.	
9.....	0.857	33.5				
10.....	0.858	33.3	"	"	"	"
11.....	0.741	59.5	"	"	"	"
19.....	0.865	32.0	"	"	"	"
20.....	0.846	35.0	"	"	64°	18°
21.....	0.865	32.0	118°	48°	145	63
23.....	0.865	32.0	113	45	135	57
24.....	0.850	35.0	Below 50	Below 10	Below 50	Below 10
25.....	0.877	30.5	73	23	93	34
26.....	0.845	35.7	Below 50	Below 50	54	12
27.....	0.871	31.5	136	58	176	60
28.....	0.861	32.5	Below 50	Below 10	Below 50	Below 10
29.....	0.845	35.7	"	"	"	"
30.....	0.862	32.4	"	"	102	39
31.....	0.870	31.6	"	"	111	44
32.....	0.890	28.5	197	92	246	119

OILS FROM OTHER FIELDS.						
12.....	0.918	22.7	276°	132°	298°	148°
18.....	0.846	35.6	Ordinary temperature.		63	17
22.....	0.865	32.0	"	"	102	39
33.....	0.923	21.9	163°	73°	203	95
34.....	0.929	29.9	115	46	17	77
35.....	0.974	13.8

lighter oils to 143° C. in the heaviest sample, for the flash point, and to 172° C. for the burning point.

We have also made distillations according to the method of Engler of seventeen samples. We have determined the carbon and hydrogen of three representative samples, and have determined the sulfur in six samples. Prof. F. N. Peters, of the Kansas City central high school, has determined the bromin absorption of eight samples. These results will be published in detail in the Science Bulletin of the University of Kansas. The following is a summary of our results:

Distillation by Method of Engler.—300 cc. of the crude oil was distilled from a 500 cc. flask, and the fractions noted, as follows:

Naphthas.....	Boiling below 150° C.....	0.0 to 12.0% by volume.
Kerosenes.....	Boiling from 150° to 300° C.....	5.0 to 40.5% by volume.
Heavy oils.....	Boiling above 300° C.....	83.0 to 45.5% by volume.
Residue.....	Not distilling in glass.....	12.0 to 3.0% by weight.

The light oil from near Bolton gave 33 per cent. of naphthas and 63 per cent. of kerosenes, leaving practically no residue boiling above 217° C.

Determination of Carbon and Hydrogen.—For our determination of carbon and hydrogen we chose three representative samples of the lowest, medium and highest specific gravity, from oils that we collected direct from the wells. The results of average determinations follow:

Oil No.	Specific gravity.	Per cent. of carbon.	Per cent. of hydrogen.
3	.940	85.33	11.80
7	.912	85.63	12.44
19	.865	85.43	13.07

It will be noticed that the carbon is nearly constant in the samples examined, and that the hydrogen increases as the specific gravity decreases. This fact is usually accounted for by considering that the heavier oils have become oxidized and contain oxygen.

Determination of Sulfur.—Sulfur determinations have been made on the same samples, showing an average of 0.27 per cent. sulfur.

We have also made sulfur determinations in the oil from Lima, Ohio. This oil gave 0.84 per cent. sulfur. This may be compared with 0.81 reported by Mabery (Am. Chem. Jour., vol. 17, p. 727) for an oil of the same specific gravity and an average of 0.59 per cent. for the field.

An oil sent to us, said to be from the Lucas gusher, of the Beaumont, Tex., field, gave us 1.89 per cent. sulfur, compared with 1.75 reported by Clifford Richardson. (Jour. Soc. Chem. Ind., vol. XX, p. 691.)

The oil from Newcastle, Wyo., gave 0.38 per cent. sulfur.

The low percentage of sulfur in the Kansas oil is of great importance to the refiner, as the sulfur compounds can be removed from the refined oil without extra treatment.